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ABSTRACT

Northeastern University's development of an elective course on aspects of cancer prevention for physician assistants is described. Faculty addressed such problems as the selection of course content, the need to make it clinically applicable, and the design of a final product that permits replication of presentation. The course uses a variety of teaching modalities such as audiovisual presentation and self-instructional modules, and a format that permits updating of content. The course was presented at four sites in different states using several scheduling variations. Course components were systematically evaluated by students and faculty, and student examination performance was analyzed. There was consistent evidence of attainment of cognitive objectives. Acquisition and retention of information was due partly to the use of self-instructional modules with review exercises and self-tests. The final field trial of the complete course provided partial support for positive attitude change regarding the efficacy of prevention. Presentation of the course as a one-semester offering, and/or assignment of course components to other courses, were considered by participants and faculty to be satisfactory formats. (SW)

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Development of an Elective Course in Cancer Prevention For Physician Assistants

Suzanne Greenberg, M.S. and Maurice Kaufman, Ph.D.

Abstract --- This article reports the development of an elective course on aspects of cancer prevention for physician assistants. Faculty addressed such problems as the selection of course content, the need to make it clinically applicable, and the design of a final product that permits replication of presentation. The course uses a variety of teaching modalities such as audio-visual presentation and self-instructional modules, and a format which permits updating of content. The course was presented at four sites using several scheduling variations. There was consistent evidence of attainment of cognitive objectives. The final field trial of the complete course provided partial support for positive attitude change regarding the efficacy of prevention. Presentation of the course as a one-semester offering, and/or assignment of course components to other courses, were considered by participants and faculty to be satisfactory formats.

Development of an Elective Course in Cancer Prevention For Physician Assistants

The Physician Assistant Program at Northeastern University was awarded a three-year contract from the National Cancer Institute to develop an elective course in Aspects of Prevention: Focusing on Cancer. The contract required that certain areas such as epidemiology, biostatistics, cancer biology, occupational and environmental health, patient health education, primary prevention and identification of patients at high risk for cancer be covered. The contract also directed that the materials be packaged so that the course could be replicable and should include self-instructional and multi-media formats. The most difficult part of the project was deciding what subjects to teach and in what depth.

Related to this problem is the scarcity of hard data on which to base material about prevention. Everyone was aware of the data relating smoking to lung, lip and mouth cancer, but members of the faculty, each an expert in his or her own field, questioned how much other factual material really existed in this area. It was decided that the course should deal with concepts that would develop a foundation for evaluating future data as well as an understanding of what was presently known. Part way through the development of the materials, the new American Cancer Society guidelines were published (1). This necessitated redoing part of the unit on Identification of the High Risk Patient but served to show how labile the state of the art is.

Recognition of characteristics of the physician assistant population influenced the development of the course. Physician assistants are mature men and women who are usually college graduates and have had prior patient care experience in areas such as nursing, respiratory therapy, women's health care, or Emergency Medical Technology. They are patient-oriented and enter the program with little, if any, knowledge of epidemiology or biostatistics. Physician assistant programs provide a combination of didactic and clinical learning experiences but do not stress basic science except as necessary for the understanding of pathophysiology and medicine. Therefore, the more clinically oriented the material the more effective it usually is. Understanding the physician assistant population helped to orient the curriculum, to select modalities of presentation, and to select faculty who planned and taught the course.

The materials eventually contained seven written self-instructional modules, one slide-tape, one audiotape, four videotapes, and two original papers and assigned readings. While these provided variety, it was felt that a uniform approach to each unit might have been easier to use. The faculty chose variety over uniformity because, in the development of any course which is geared for clinicians but contains primarily conceptual and statistical data, it is necessary to present the material in as engaging a manner as is possible.

Stages in Development

In the spring of 1980 a preliminary version of the course, Aspects of Cancer Prevention, was presented to twenty-four second-year physician assistant students at Northeastern University. The course included lectures which were recorded on videotape as they were presented, a commercial film, three printed self-instructional modules, a set of videotaped vignettes, and five examinations. The content of lectures recorded on videotape was used subsequently to generate additional instructional materials.

Content was substantially revised and expanded between the summer of 1980 and the spring of 1981. In the spring and summer of 1982 the course was presented at three sites: Northeastern University, Mercy College of Detroit, and Wichita State University (during a two-week summer term). The content included an introduction to epidemiology and biostatistics and to cancer as a public health problem; cancer biology; occupational and environmental risk factors; the role of regulation in prevention; information on how to take an occupational history; the role of life style in cancer risk (including diet, smoking, alcohol, and stress); patient health education; cost effectiveness of screening programs; the use of the laboratory in cancer screening; evaluation of the high risk patient. An Instructor's Manual was written and supplied to instructors at each site.

Course components were systematically evaluated by students and faculty, and student performance on examinations was analyzed. As a result, additional revisions and refinements were made. Among changes were the following: an article was written on Diet to replace a videotaped lecture; an article was

written on smoking cessation programs; several printed self-instructional modules were extensively revised or rewritten; examinations were further revised. With the completion of these revisions, the entire course was presented at the University of Florida at Gainesville in the winter of 1982.

A different format was used at Northeastern University in 1981-1982. Three of the self-instructional modules were integrated into other courses at Northeastern University. The remaining material was presented in an abbreviated course in the spring.

Following the 1981-1982 presentations at Gainesville and Northeastern, minor corrections were made in printed modules and examinations. The course materials in their final form include an Instructor's Manual, set of examinations, four videotapes, one commercially-produced film, one audiotape, one slide-tape, role-playing exercises, seven self-instructional modules, two published papers, and two original papers. The printed materials for student use are organized into nine bound books: an introduction and eight units: 1) Cancer Biology, 2) Cancer Epidemiology, 3) Occupational/Environmental Cancer Risks and Interventions, 4) Risk Factors for Cancer: Lifestyle, 5) Patient Health Education, 6) Smoking: Psychology and Interventions, 7) Cancer Screening: Early Detection and Cost-Effectiveness, 8) Evaluation of the Patient at High Risk for Cancer.

The Instructor's Manual contains teaching plans, discussion guides and exercises, organized for a twelve-session course. all printed material given to students and all mediated material are cross-referenced in the Instructor's Manual. The Manual also contains an attitude measure, all content examinations, and transcripts of mediated material.

Evaluation

Student responses to questions on course evaluation forms helped to direct the development and revision of course content and the selection of modes of presentation. When students commented that the videotaped lectures about Diet failed to maintain their interest, it was replaced with a printed article on that topic.

Student responses also helped to identify strengths and limitations. Although much content was presented through pre-recorded media and self-instructional printed modules, students considered the Instructor's role important. Students' evaluations stated that they had learned a great deal. This was substantiated by the test results. They felt the review exercises and selftests, contained in the self-instructional modules, aided retention, and they expected the knowledge they had acquired to prove valuable in their careers. The units on Cancer Screening and on Evaluation of the Patient at High Risk for Cancer were considered highly relevant. Students particularly valued the subject matter in these units and the presentational formats which were helpful to their understanding and retention. Students were critical of the formal examination items, and they were less interested in the non-clinical topics such as biostatistics.

At one site (Wichita State University), the course was compressed into a two-week period. Students were dissatisfied with the time available for the work, and their achievement scores on quizzes were lower at this site than at others. The format of inserting some of the units in already designed courses and presenting an abbreviated six-week course which was tried at Northeastern University in 1981-1982 was considered extremely attractive by the students.

Examination items were first prepared for the 1980 presentation of the course. They corresponded to cognitive objectives and content outlines written at that time. The resulting pool of 220 examination items was the starting point for the examinations used in 1981. The revision of objectives and content outlines required the deletion and addition of items. Moreover the pool of items was revised to make the format uniform and to improve item clarity. Items were framed as multiple-choice items using formats recommended by Hubbard (2).

A comprehensive examination for pre- and posttesting and a set of quizzes were constructed from the revised pool of items. These examinations were used in 1981 at Northeastern University, where first-year and second-year physician assistant students received the course, and at Mercy College of Detroit and Wichita State University. Posttest results from Wichita State were lost in transit and cannot be reported. The t test for correlated observations was applied to the pre-posttest results from Northeastern and Mercy College. Findings are presented in Table 1. Significant gains resulted at these two sites.

Table 1 here

Examinations were revised as part of the changes that followed the 1981 field trials. Pre- and posttesting were used during the course presentation at the University of Florida at Gainesville, where the entire course was presented in 1982. A revised examination of fifty-five items was used. The t test for correlated observations was applied to the pre- and posttest results at Gainesville. Test results are presented in Table 2. Significant gain was made on the posttest.

It is clear from the comparisons of pretest and posttest performance that students do show appreciable increase in knowledge about cancer prevention as a result of completing the course.

Table 2 here

Two instruments were used to measure attainment of affective objectives. These included two categories of the Medical Opinion Survey developed at the University of Toronto. The categories were Preventive Medicine, to measure expected outcomes, and Doctor-Patient Relations, to serve as a control in that no change was expected. The other instrument, used in its entirety, was the Cancer Attitude Inventory, developed at the University of Wisconsin at Madison.

Three categories measure expected outcomes: Etiology and Prevention; Early Detection and Screening: Risk Management. A fourth category, Physician-Patient Relations, served as a control because no change was expected.

Each category of the Medical Opinion Survey consists of nine items rated from 1 to 5. The score obtained on a category can range from 9 (the extreme of unfavorable attitude) to 45 (the extreme of favorable attitude) with 27 interpreted as neutral. The categories of the Cancer Attitude Inventory contain nine or ten items. Each item is rated on a seven-point scale from +3 (favorable) to -3 (unfavorable), with zero as neutral. The score obtained on each of the following, Etiology and Prevention, Risk Management, and Physician-Patient Relationship, can therefore range from +30 (favorable end) to -30 (unfavorable end). The score obtained on Early Detection and Screening can range from +27 (favorable end) to -27 (unfavorable end).

Data on one or both instruments were obtained at each field trial site. A comparison of pre- and post-administration results, presented in Table 3, shows little evidence of positive attitude change that can be ascribed to participation in the course, Aspects of Cancer Prevention. Northeastern University second-year students showed significant positive attitude change on the Early Detection and Screening category of the Cancer Attitude Inventory in 1981. Students at Wichita State University showed a negative attitude shift in the Risk Management category during the 1981 trial. The strongest indication of positive attitude change occurred at the presentation of the complete course in its final version at Gainesville in 1982. Significant positive change resulted

on the Etiology and Prevention category and the Risk Management category of the cancer Attitude Inventory. However, positive change also occurred on the Physician-Patient Relations category, on which no change was expected.

It can be seen on Table 3 that all mean pretest scores demonstrate initially favorable attitude. It is not surprising that significant improvement in attitude did not usually occur as might have been expected if initial attitude toward any category had been neutral.

Table 3 here

Discussion

The results of the several field tests demonstrate that there was substantial increase in knowledge of cancer prevention. Acquisition and retention of this information is due partly to the use of self-instructional modules with review exercises and self-tests. There was some evidence from the final trial of the complete course that the increased knowledge was accompanied by positive change in attitude concerning the efficacy of prevention and risk management. That there are few instances of positive attitude change may possibly be attributed to the fact that students in physician assistant programs already have somewhat positive attitudes toward cancer prevention. Those who elect a course in cancer prevention perhaps have an even more strongly positive attitude.

Student responses on course evaluation forms helped to identify several limitations and to suggest how the course could be made more effective. The difference in format between examination items and self-tests can be addressed by providing some exposure to questions in the examination format before using the examinations. Also, class time needs to be scheduled to review examination results.

The course instructor should be well-versed in the subject matter. This person should be able to answer questions, lead creative discussions, fill gaps, and relate the material to clinical experience. The instructor should update information about several topics including risk factors and present new information in sufficient depth. Since most of the material sets down basic principles of prevention, perhaps the most effective way to update would be to bring in speakers current in their fields to discuss each of the units.

Two scheduling arrangements that were tried appear to be satisfactory. One is to present the entire course over one academic quarter or semester. The second is to place some of the units or constituent modules into already established courses, for example, to assign the cancer biology module to the appropriate place in the pathophysiology and medicine course.

One problem that will need to be met as the course is used in the future is updating the content. To anticipate this problem, all printed materials have been printed and bound in plastic bindings making it possible to replace

individual pages. Editing was done on a word processor, making revision simpler. Videotapes cannot easily be altered and would have to be redone, or be replaced with other modes of presentation if the originals become outdated. The slides of the slide-tape can be replaced, and an updated written script can be substituted for the audiotaped portion.

In conclusion, having identified the content to be taught, and understanding the population to be educated allowed the faculty to develop interesting and varied modalities which helped physician assistants to learn basic concepts of prevention. This approach and material should also be of interest to medical students, residents, nurse practitioners and other clinically oriented medical practitioners.

References

1. "ACS Report on the Cancer-Related Health Checkup," CA 30: 194-240, 1980.

2. Hubbard, J.P. Measuring Medical Education: The Tests and the Experience of the National Board of Medical Examiners. (2d Edition). Philadelphia, Pennsylvania: Lea and Febiger, 1978.

TABLE 1

Comparison of Pre- and Posttest Results for the Cognitive Achievement Test of Fifty-Six Items Administered as Part of the Course: Aspects of Cancer Prevention in 1981

Group	N	Pretest Results (In Percent)		Posttest Results (In Percent)		t
		Mean	SD	Mean	SD	
Northeastern University First-Year Students	22	48.7	13.0	71.8	7.2	8.132**
Northeastern University Second-Year Students	21	49.9	5.8	75.4	4.6	13.772**
Mercy College of Detroit	9	53.2	9.1	64.9	8.1	4.162*

* Significant at $p<.01$ level.

** Significant at $p<.001$ level.

TABLE 2

Comparison of Pre- and Posttest Results for the Cognitive Achievement Test of Fifty-Five Items Administered as Part of the Course: Aspects of Cancer Prevention, at the University of Florida at Gainesville in 1982

N	Pretest Results (in Percent)		Posttest Results (in Percent)		t
	Mean	SD	Mean	SD	
29	51.2	8.2	70.8	8.3	12.131*

* Significant at $p<.001$ level.

TABLE 3

Comparison of Pre- and Posttest Results for Measures of Attitude Change In Field Trials of Aspects of Cancer Prevention, A Course for Physician Assistants

Field Trial Group	Scale	Pretest		Posttestt		t
		Mean	SD	Mean	SD	
Northeastern University	PM	35.5	4.8	37.1	5.3	1.861
First-Year Students	DPR+	34.2	4.9	34.0	6.4	-0.165
In 1981 (N=22)	EP	18.1	5.4	16.4	6.5	-1.171
	EDS	19.0	5.5	17.1	6.3	-1.472
	RM	21.8	6.4	19.8	7.8	-1.055
	PPR+	19.9	5.2	19.5	6.1	-0.334
Northeastern University	PM	37.0	3.5	36.7	4.3	-0.325
Second-Year Students	DPR+	34.0	3.5	34.6	5.5	0.617
In 1981 (N=22)	EP	15.5	5.2	16.3	5.6	0.702
	EDS	15.9	4.1	18.1	3.6	2.441*
	RM	20.2	5.2	19.8	5.5	-0.345
	PPR+	21.8	5.1	22.4	4.0	0.699
Mercy College of	PM	35.7	3.7	35.2	2.9	-0.503
Detroit in 1981 (N=9)	DPR+	34.4	4.2	34.7	5.2	0.214
Wichita State	EP	9.1	10.5	7.7	11.5	-0.472
University in 1981	EDS	17.7	8.1	12.7	8.9	-1.270
(N=8)	RM	20.4	6.5	11.5	9.0	-2.564*a
	PPR+	18.4	8.4	17.7	7.6	-0.353

TABLE 3 (cont'd)

Field Trial Group	Scale	Pretest		Posttest		t
		Mean	SD	Mean	SD	
University of Florida	PM	34.6	3.8	35.7	4.6	1.539
at Gainesville in	DPR+	34.0	3.1	34.0	3.3	-0.057
1982 (N=29)	EP	10.8	4.6	14.5	7.1	3.385**
	EDS	15.6	4.7	16.4	6.3	0.655
	RM	18.8	5.9	20.7	5.4	2.172*
	PPR+	17.3	5.2	19.6	5.9	2.661*
Northeastern University	PM	36.4	3.1	37.9	3.7	1.903
In 1982 (N=18)	DPR+	33.9	3.4	34.1	4.1	0.294

+ No change was expected on DPR and PPR scales

* Significant at $p<.05$ level.

** Significant at $p<.01$ level.

a Negative attitude change